TMF

February 1991

THE MAC FLYER - For Greater Safety in MAC Air Operations

1990 MAC Safety Awards Winners . . . Page 16

TMF

THE MAC FLYER—For Greater Safety in MAC Air Operations

February 1991 MACSP 127-5 VOL XXXVIII NO. 2

page 13

page 24

Gen. Hansford T. Johnson — Commander in Chief
Col. Donald E. Loranger, Jr. — Director, Quality Support and Readiness
Col. Thomas M. James — Director of Safety

Lt. Col. Richard L. Buck — Supervising Editor
Maj. Dale E. Van De Ven — Associate Editor
Maj. Stephen E. Behr — Associate Editor
Mrs. Frances A. Caldwell — Writer/Editor
Mr. Tommy F. O'Laughlin — Art Director

The MAC Flyer is published by the Director of Safety, Military Airlift Command. The contents are informative and not regulatory or directive. Names of people and places in mishap stories are representative and not necessarily of the aircraft or equipment involved. Information in any article may not be construed as incriminating under Article 31, UCMJ.
Contributions, comments, and criticisms are welcomed. Write: The *MAC Flyer*, HQ MAC/QSSE, Scott AFB, IL 62225-5101. Or call DSN: 576-5534/6042 or commercial: (618) 256-5534/6443. The editors reserve the right to make editorial changes in manuscripts which they believe will improve the material without altering the author's intended meaning.
Subscriptions are available from: The Superintendent of Documents, Government Printing Office, Washington, DC 20402. Changes of address for subscription mailings should be sent to the GPO. Give both old and new address, including zip codes. USAF Active and Air Reserve Forces units should establish magazine requirements through the OPR (HQ MAC/QSSE). Other U. S. Military units should consult administrative directives.
The MAC Flyer is published at an approximate ratio of one magazine for every five MAC crewmembers, and one for every twenty MAC support personnel. Distribution: X: OPR: HQ MAC/QSSE. ISSN 0034-7043.

FEATURES

4 **Moving To Quality: The Quality Visit**
We really are here to help.

7 **Confessions Of A Starlifter Pilot**
Overconfidence in high technology.

10 **Icing: Performance Issues**
Where is more important than how much.

16 **1990 MAC Safety Awards**
And the winners are . . . .

24 **C.R. Terror**
The Great One infiltrates the aero club.

DEPARTMENTS

18 **Mishap With A Moral**
23 **Flying-Hour Milestones**
27 **Quickstoppers**
31 **After Deadlines**

ONLY 59 DAYS LEFT! ! !

That's right. As of 1 Feb 1991 you only have 59 days left until that magic postmark of 31 Mar 1991. You've also exhausted all your acceptable excuses for not having yet submitted your entry to the 1991 MAC Flight Safety Writing Contest. You were busy in December (what with all that Holiday shopping, etc.); you were busy in January recuperating from all December excesses (eating, spending, etc.) Now, what will be your excuse in February? You really have none.

So, join in the spirit of George, Abraham, and St Valentine—those upstanding, unselfish, and dedicated folks (they never had excuses . . .) and do something for your fellow man. In your flying experience, or knowledge of flight operations, you just may have that one little bit of knowledge that could prevent a mishap from happening or prevent someone else from making the same mistake. Our contest's purpose is to promote flight safety, and "safe flying" means lives saved. Now aren't these reasons well worth your effort?

You'll be well rewarded for your contribution. You'll receive a personal, complimentary copy of *TMF* every month for the next year, and if your story is one of the twelve selected for print, you'll also receive an engraved plaque, accolades from your supervisors, and envious looks from your contemporaries. So enter now, only 59 days left! ! !

THE RULES

The 1991 MAC Flight Safety Writing Contest is conducted according to MACR 900-3 and these rules. Entries must be original, unpublished, contain an aviation safety/mishap prevention message, and be postmarked no later than 31 March 1991. Stories must be between approximately 1,000 and 3,000 words long (about 6 to 14 double-spaced types pages). Poetry should average 75 to 100 lines. Manuscripts must be typed, double-spaced, and submitted in two copies. Identify entries by title only and attach a cover sheet indicating author's name, address, duty phone, unit, and home address. Please include a brief biography.

The contest is open to all. Entries qualifying under the above rules earn their author a complimentary one-year subscription to *TMF*. However, desk sets and plaques may only be awarded to military members and civilian employees of the Department of the Air Force and Air Reserve Components. Other entries may be selected for Honorable Mention Special Category.

Winning entries will be published in *TMF*.

Submit to:

MAC Flight Safety Writing Contest, 1991
HQ MAC/QSSE
Scott AFB, Illinois 62225-5101

The MAC Vision

Proud MAC: Support America Can Always Count On.

- *Proud MAC:* Recognizes our long and proud airlift heritage and seeks to instill in *each* MAC member a sense of pride in themselves and the support they provide to the command—the Air Force—and America.

- *Support:* Up-front acknowledgement that the business of the command is to support our worldwide customers.

- *America:* Identifies the nation as MAC's ultimate customer, whether we are transporting combat troops or providing disaster relief.

- *Can Always Count On:* States our challenges for the future to be prepared and capable of providing required support on time, every time.

Moving to Quality:
The Quality Visit

By Maj. Stephen E. Behr
Associate Editor

During the fall 1989 Volant Rally, General H. T. Johnson, CINCMAC, subordinate MAC commanders and senior HQ MAC staff, met to begin the process of bringing a cultural change to MAC—a philosophical change pushing authority, responsibility, and accountability down to the lowest practical level; and to integrate quality into daily activity of the folks in the command.

One of the earliest, most apparent changes affected aircrew responsibilities. Aircraft commanders were given more authority in determining crew duty-day extensions.

In April 1990, MAC's senior leadership met in conference to further define where the command would go during the 1990s and set the framework for that direction. The conference developed the MAC vision, values, and drivers.

The MAC vision serves as a beacon to direct command actions and guide efforts into the 1990s and beyond. All decisions must be made in the context of their contribution toward achieving the vision: ***Proud MAC: Support America Can Always Count On.*** MAC values—integrity, service, accountability, and responsiveness—support and sustain our capability to accomplish any assigned mission. The drivers focus our efforts on mission elements that will allow us to achieve our vision. Concentration on the following drivers will precipitate the cultural change: mission, people, quality, pride, and teamwork.

During a 26 October, 1990, speech, General Johnson, expressed his views on quality's place in MAC.

"Much of what we are doing is not new. This emphasis on quality is not the latest management gimmick or fly-by-night theory. It is an effort to put into action the management philosophies and ideas we have all studied for years. We want to create a

structure and a mind set that will facilitate moving these theories from the classroom to the flight lines, the aerial ports, the chow halls, and the hospitals.

"MAC is a support organization and proud of it! We all understand our important role in protecting America's security and we want to provide our customers with quality support."

As part of the emphasis on quality and a resolve to depend on individual integrity, MAC no longer has an Inspector General. The Inspector General was designated on 1 January, 1991, as the Deputy Chief of Staff, Quality Support and Readiness. It is not a superficial change; it is a move to provide a structure that will facilitate increased productivity. As Col. Donald E. Loranger, Jr., Deputy Chief of Staff, Quality Support and Readiness, has often stated, "We must focus on achieving a command environment featuring customer service and a quest for continuous improvement in everything we do." A major improvement is the replacement of traditional assessment tools with a system consisting of the Quality Visit, and a restructured ORI which will be strictly "results" oriented.

A single annual Quality Visit will be conducted in lieu of a Unit Effectiveness Inspection, Commanders Facility Assessment, Staff Assistance Visit, and the many different Standardization and Evaluation Teams (like ASET, MSET, PERSET, and CSET). The Quality Visit will not be an inspection, it will be process oriented, and CINCMAC will participate in each visit. The objective of the Quality Visit is to assist units to better serve their internal and external customers and provide feedback to commanders on functional areas successfully meeting customer needs and those requiring additional attention. Since the Quality Visit isn't an inspection, no exercises will be initiated by the Quality Enhancement Team (QET), and no grade will be associated with a Quality Visit. The visit is divided into three phases: pre-visit, visit, and post-visit.

During the pre-visit phase, the Hq MAC staff will highlight unit areas needing potential assistance. About two months prior to the visit, each functional area of the headquarters will indicate areas where assistance may be required. A message to the unit commander will identify the staff input and offer assistance in other areas, such as quality training and quality process. The month prior to the visit, the unit will identify exactly what areas in which the unit commander desires QET concentration. Based on the areas identified and requested, the Director of Readiness then tailors the QET to meet the customer's needs.

Each QET will be different and could include members of MAC staff agencies as required to address specific requirements identified by the unit commander. Members of the QET will be trained facilitators who can focus the energy of a group on a common task, and suggest alternative methods and procedures; a facilitator does not evaluate.

When the QET arrives at a base, the host unit briefs the QET on their quality training programs at all levels, identification of unit critical processes, identification of customers, prioritization of customer requirements, and how user satisfaction levels are determined. Additional items include efforts to improve customer service, identification and prioritization of supplier requirements, and even areas where process improvement hasn't been successful or those areas where higher authority is required to effect improvement.

After the arrival briefings, the QET will split into functional area teams to address functional areas of requested or required assistance. A very important part of the visit will be visiting functional and cross-functional process improvement teams at the wing, squadron, and work centers.

Some traditional activities will still be found during a Quality Visit: a personal conference period, and a Resource Utilization Conference Period (formerly known as Fraud, Waste, and Abuse).

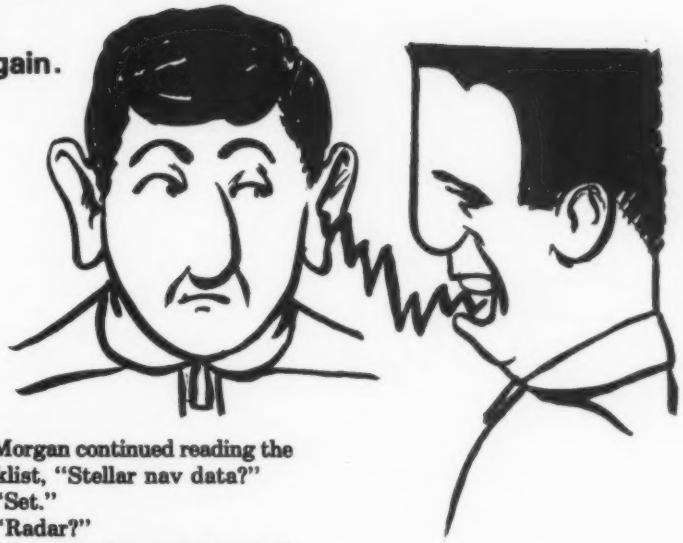
At the conclusion of a QET visit, the Deputy Chief of Staff, Quality Support and Readiness, will brief CINCMAC on highlights and issues to be forwarded to the MAC staff for resolution or crosstell. The unit commander will brief the unit's quality process/program, how the unit is managed, the unit's ability to identify, measure, and satisfy customer requirements, and results of the quality visit. As part of the debriefing, the unit commander will indicate to CINCMAC the degree to which the QET objectives, highlighted by the unit commander, prior to the visit, were met. In short, the unit commander will "grade" the level of assistance provided by the QET.

MAC continues to review a second form of unit assessment, the Operational Readiness Inspection. The result could well be a visit that centers on combat readiness, resource protection, fiscal responsibility, and inspections required by law. This visit will likely be an objective, results-oriented assessment during surge conditions of the airlift system at all levels, represented as "effective" or "ineffective" (pass/fail) where customer service and support is a primary driver.

As General Johnson stated at the conclusion of his speech before the Air Force Association Symposium in Los Angeles, "The better that MAC supports our customers, the better MAC will support America. And that's why we exist—to provide the support America can always count on." ★

Confessions of a Starlifter Pilot

Complacency almost strikes again.



By Capt. Philip A. Bossert, Jr.

The view from the pilot station was spectacular. It was so stunning, in fact, that Capt. Bob Hathaway momentarily caught his breath. The red velvet canyons, broken up occasionally by huge ridgelines, dotted the harsh landscape. Sandy, pockmarked plains lay just beyond the canyons, and the morning sun reflected the red sand's shiny surface, making the plains look like ruddy lakes. Although man first visited this brutally desolate wasteland over 25 years earlier, it seemed as if they were the first humans here.

As they broke out of the high level overcast and began their final descent, Hathaway called for the approach/landing check.

"Crew briefing," stated his copilot, 1st. Lt. Mike Morgan.

"Crew, attention to the approach brief," replied Hathaway. "This will be a MLS approach to Runway 24. Decision height is ten meters, nav radio set on 1124.32. Approach speed 315. Elevon setting 28 degrees. Minimum safe altitude 32 klicks, large mountain 2 kilometers northeast. Crew briefing completed."

Morgan continued reading the checklist, "Stellar nav data?"

"Set."

"Radar?"

"Set to final approach mode."

"Dust filters?"

"Armed."

"No smoking switch?"

"On."

"Altimeter setting?"

"0501."

"Landing lights?"

"Extended and on."

"Landing skids?"

"Down, copilot."

"Down and locked, pilot."

Lieutenant Morgan finished with, "Approach/landing check completed, 18 minutes, 42 seconds until touchdown, altitude 86.8 klicks."

As the crew began to prepare for the final minutes of the flight, the autoland system began smoothly maneuvering their huge CT-469 transport, an old but still reliable starlifter of the 20,000-ton class, onto the initial segment of the high level portion of the approach track.

"This is almost too easy, boss," stated Morgan.

"Yeah, I know," replied Hathaway. "God help us if we ever had to fly this beast ourselves."

After that statement the crew capsule got very quiet. Hathaway's last comment made them all think—and think hard.

Were they too dependent upon their automated vehicle? Were they getting a little lax with the tremendous redundancy and reliability of their state-of-the-art

---

HONORABLE MENTION

1990 MAC FLIGHT SAFETY WRITING CONTEST

starlifter? These thoughts and doubts were suddenly uncovered by Captain Hathaway and Lieutenant Morgan's brief exchange, and in a few minutes, they would learn a very valuable lesson about high technology complacency.

The silence was broken by the engineer's announcement, "Fifteen minutes, 12 seconds until touchdown, altitude 64.32 klicks."

"Anyone want something to drink before we land?" asked the loadmaster over the intercom.

"Sure, I'll take a half cup of coffee, black, in a double cup," shouted Morgan eagerly.

"I'll take a cup of orangeade," said Hathaway.

"When did you start drinking orangeade?" asked Morgan.

"Oh, a while back," replied Hathaway. "I picked it up on a trip to Triton last year. I really like it a lot."

The easygoing atmosphere in the cockpit started again after a momentary break as they plunged closer to landing, unaware they were letting their guard down and comfortable with the thought their high-tech craft would save them from anything.

"13 minutes, 27 seconds until touchdown, altitude 51.7 klicks," rattled the engineer.

"Hey Mike, how much time you got left?" asked Hathaway.

"Exactly ten months, eight days, and 12 hours, but who's counting?" replied Morgan.

"Are you getting out or what?"

"Don't know yet, Bob. It'll depend on what they offer me. I'd take a command post on Europa, or a remote to Pluto—anything except Altus."

"Yeah Mike, I know what you mean. Anything but Altus," repeated Hathaway.

"What about your plans, Mike?" asked Morgan.

"Well, I'd like to fly these a few more years, but I'm trying to get a job as an air attache to the United Kingdom."

Morgan shot back, "You mean you're not going to a staff job?"

"Well, with the pilot shortage, I think I'll be able to get out of it for now."

"Good luck," wished Hathaway.

Suddenly, the engineer interrupted their lively conversation. "Pilot, engineer. We have a problem."

"What's up, engineer?" asked Hathaway, now suddenly serious, the lightheartedness obviously out of his voice.

"We have an unsafe landing skid indication, left main," explained the side-seater. "And, by the way, nine minutes, 15 seconds until touchdown, altitude now 38.5 klicks."

Stunned by the sudden turn of events, Hathaway called for the emergency landing skid extension checklist and told the scanner to scan the skid.

"You want me to fly the craft?" asked Morgan.

"Good idea," replied Hathaway.

Now perspiring heavily and still trying to get back to reality, Hathaway opened his checklist and began following the engineer and scanner.

"Sir, we have another problem," announced his engineer, ominously.

"What the hell is it now?" asked Hathaway, his voice wavering slightly.

"Sir, we have a 'low fuel' indication. Eight minutes, 48 seconds until landing, but only 20 minutes of fuel remaining.

"Why didn't you make this known earlier?" questioned Hathaway.

"I did," shot back the flustered engineer, "several times earlier as we entered orbit, but you said we'd be fine."

The confusion, pressure, and task saturation began building rapidly, like a huge tidal wave about to swamp them.

Hathaway quickly said, "Well, crew, we can't have much of a delay with this procedure, we're real tight on fuel."

The view outside was becoming even more spectacular as they began lining up for their final track. It would take them into a huge canyon and then finally out onto the Sierre Madre plains

"The entire ship fell quiet so they all realized they were in serious trouble."

where Outpost 42, their destination, lay.

Over 300 feet behind the crew capsule, the scanner was working feverishly to manually extend the left main skid, making slow but steady progress.

The scanner interrupted the confusion in the capsule by stating, "Another six or seven minutes and I'll be finished."

"Damn! Damn! Damn!" shouted Hathaway. "Can't you move any faster?"

"Sir, I'm doing the best I can," replied the scanner, defensively.

"We're going to be pretty tight on fuel. Tell Approach we can't have a delay," commanded Hathaway.

After Morgan passed this information to Approach, he told Hathaway, "Sir, I've some bad news."

Hathaway asked in a defeated tone. "Don't tell me, they've closed the field."

"No, not quite. A dust storm

just kicked up, and vis and winds are barely within limits."

"What's next?" shouted Hathaway, now visibly affected by the stress.

The entire ship fell quiet as they all realized they were in serious trouble and that they were going to need lots of airmanship and luck to pull them through.

It finally hit Hathaway that the entire crew was relying on him to pull them out of this mess. After calming down a bit, taking stock of the situation, and remembering all he had learned in capsule resource management, Hathaway got his plan of attack down. In a voice indicating he was finally and clearly in command, he ordered, "Copilot, continue flying the craft. Scanner, how's it going?"

"Two minutes and the skid's down."

"Engineer, fuel state."

"Eight minutes, 15 seconds of fuel remaining. Five minutes, 35 seconds until touchdown, altitude 17.3 klicks."

"Crew, this is the AC. Continue working, but listen up carefully. We're low on fuel and the left main skid is almost down. We're going to continue the approach. Weather is marginal, but we've only got one chance. Any comments, questions, or suggestions?"

There were none, except acknowledgments of agreement and support from the crew.

As they continued descending on the final approach track, Hathaway pondered briefly on how things had deteriorated so quickly. Were they a little lax in monitoring their fuel, updating the weather, and just keeping up with everything? Had their automated vehicle put them into "cruise complacency mode?" Hopefully he would have time later, after landing safely, to sort these issues out and maybe write them up to warn others.

"Pilot, scanner."

"Go ahead, scanner," shot back, Hathaway.

"Sir, we got the skid down safely."

A sigh of relief swept through the ship. Maybe things were beginning to turn around or maybe the real fun was about to begin.

Lieutenant Morgan frantically announced, "Sir, one minute 41 seconds until landing, altitude 0.7 klicks. Final approach mode engaged. MLS ident checks out."

"Mike, I'll fly from this point. Pilot's craft," stated Hathaway.

"Pilot's craft," replied Morgan with obvious relief in his voice.

"Pilot, engineer, we have three minutes, 12 seconds of usable fuel remaining."

Hathaway replied, "Well crew, this is our only shot. Help me make it a good one."

Luckily for Hathaway, the autoland system was still working and guiding them to a perfect MLS approach and touchdown.

A little over a minute later, Morgan announced, "Outer marker, 32 seconds until touchdown, final configuration checked, copilot."

"Checked pilot," added Hathaway. "Get another weather check."

About the same time Approach Control stated the vis was 50m, winds 330/82 knots, all just within limits, the autoland system disengaged itself.

"Pilot's flying, autoland off," stated Hathaway, now heavily perspiring, trying to manually fly a 20,000-ton starlifter down to a one-shot, vis only, approach and landing.

Hathaway worked feverishly to align the crossbars of the MLS on his HUD, keeping them just within limits. Morgan anxiously announced, "100 meters above decision height."

Just when Hathaway thought his lack of proficiency was about to cost him this approach along with his life and the lives of his crew, Morgan shouted with obvious joy, "Decision height, we have positive MLS contact!"

As their CRTs indicated, outpost 42's MLS system had "grabbed" their starlifter and automatically activated its VSTOL engines and guidance system to gently touch it down on the landing zone. Red dust encircled their vehicle as they landed.

After the engines began automatically shutting down, Hathaway leaned forward with his hands on the console, eyes closed, breathing heavily.

"Great job, boss," Morgan and the engineer both stated, overjoyed that they were alive.

"Thanks guys," replied Hathaway. "I think we all learned a hell of a lot from this, especially me, and we'll talk about it in the club later over some Martian martinis."

"First round on you boss?" asked the scanner.

Hathaway shot back with relief and embarrassement in his voice, "Guys, after this approach and landing, all the drinks are on me."

Capt. Philip A. Boisert, Jr. (a three time winner in the 1990 writing contest) is a 1982 AF Academy graduate who is currently a C-141 IP at McGuire AFB, N.J.

ICING: Performance Issues

By Capt. Gary A. Wagner
Air Canada

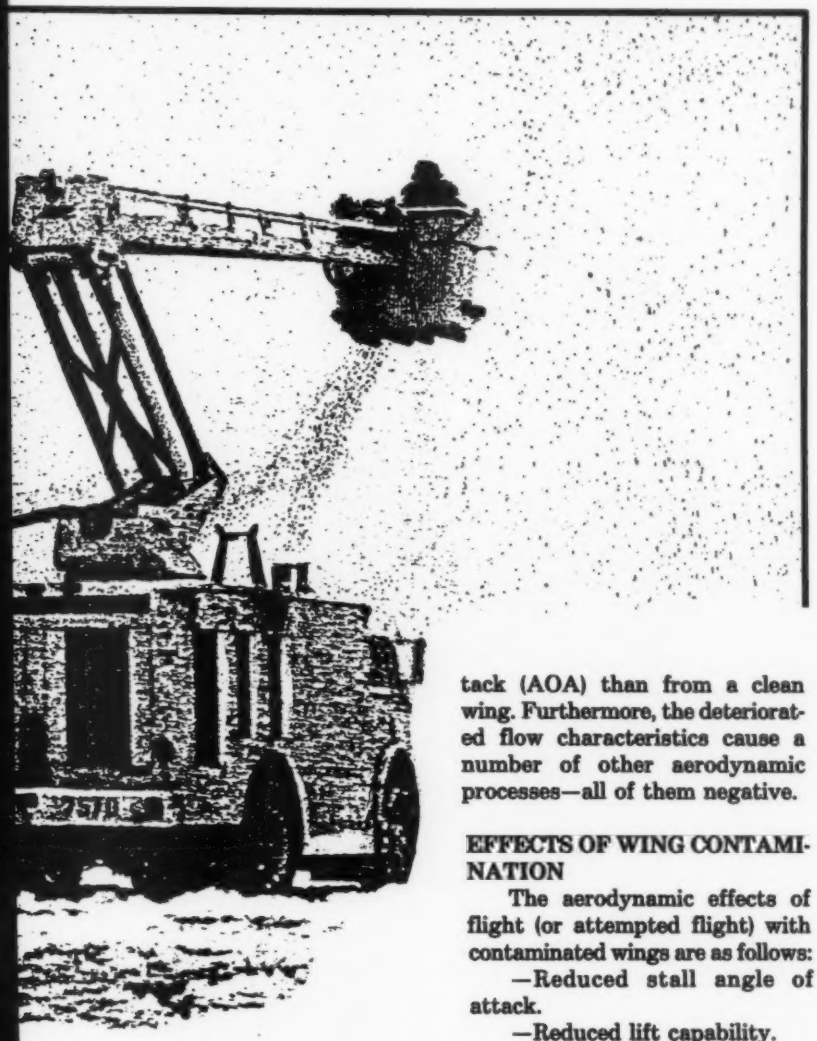
Throughout aviation history, we have witnessed a number of mishaps resulting from aircraft taking off after exposure to snow or other forms of freezing precipitation. Aircrews understand the requirements for "clean aircraft," but at times pilots must exercise their own judgment to determine if small accumulations may have an impact on aircraft performance.

Since small amounts of contaminant do not seem to to be enough to affect the lifting characteristics of a wing, assessment becomes difficult.

ASSESSING THE CONTAMINANT

Any change to the wing profile will increase total drag and decrease maximum lift capability. Interestingly, the negative effects of the contaminant are more related to location than to depth or thickness.

The ability to generate lift is proportional to the smoothness of air flow, especially over the first 20 percent of the wing chord. The flow stability in this forward wing



section depends on contaminants not disturbing, in any way, the boundary layer (the very thin layer of air against the wing skin). Unfortunately, frost, light snow grains, and similar contaminants are of the same thickness as the leading-edge boundary layer. These extremely thin contaminant layers, which are only millimeters thick, are enough to disturb the thin boundary layer and severely affect airflow. When this happens, airflow over the wing separates at a significantly lower angle of attack (AOA) than from a clean wing. Furthermore, the deteriorated flow characteristics cause a number of other aerodynamic processes—all of them negative.

EFFECTS OF WING CONTAMINATION

The aerodynamic effects of flight (or attempted flight) with contaminated wings are as follows:

—Reduced stall angle of attack.

—Reduced lift capability.

—Increased stall speed.

—Reduced lift at a given AOA and airspeed, especially with higher AOAs.

The last item is a result of the wing being less efficient. Performance at a given AOA (or pitch attitude during rotation), for a given airspeed, will be less than expected.

The degree of performance loss is related to the amount of the wing that is contaminated and the type of contaminant. The following changes in aircraft handling characteristics can result:

—Greater pitch attitude needed for liftoff.

—Greater "pull force" required on the elevator control to achieve normal rotation rate because the wing contaminant increases nosedown pitching moment.

—Increased takeoff run.

—Decreased aircraft acceleration in the high AOA region due to significant increases in drag.

—Flight director takeoff pitch attitude potentially beyond the contaminated wing's stalling AOA.

—Less reliable stall warning system indications.

—Potential loss of aileron control during liftoff due to airflow separation near the ailerons.

—For certain aircraft with fuselage-mounted engines, airflow separation resulting in poor airflow into the engines, in turn causing engine surging and worse, engine stall.

—Finally, if the contaminant effect is significant enough, loss of ability to successfully take off and climb using normal speeds and handling techniques.

STALL WARNING SYSTEMS

Most transport aircraft stall warning systems sense AOA with sensors mounted on the aircraft fuselage. They process this information, along with aircraft configuration to determine the current margin from the stalling AOA. For example, if the stalling AOA is 14 degrees, the stall warning system may be set at 3 degrees; this gives the pilot a three degree buffer in AOA prior to stall.

With moderate wing contamination, however, a loss of four degrees is not unusual. This would result in a stalling AOA of ten degrees. Because the stall warning system cannot sense airflow over the wing and does not recognize contamination, it would not trigger a stickshaker until 11 degrees;

one degree past actual stall. Thus the aircraft could stall and the only warning would be loss of performance and control problems, not the stall warning system.

Takeoff or go-around with a contaminated wing and aircraft attitude right at "the edge of the stickshaker" will provide significantly less lift, and more drag, than what could be achieved at a lower AOA. In flight, pilots have no way of determining the maximum performance-handling profile for a contaminated aircraft. Maximum aerodynamic performance for most transport aircraft with contaminated wings could possibly be betwen three to five degrees AOA prior to stickshaker.

GROUND EFFECT

Ground effect gives a performance increase for a given pitch attitude. This is a result of ground effect reducing the required AOA. If aircraft wings are contaminated, ground effect may reduce AOA just enough to get airborne. However, as the contaminated aircraft climbs, loss of ground effect will increase AOA and result in significant performance loss.

OPERATIONAL COMMENTS

In flight, aircraft deicing/anti-icing systems keep wing leading edges (and other protected surfaces) clean and preserve normal aerodynamic characteristics. Systems must be used as directed in the operating manual.

Pilots should fully understand each type of system to recognize its limitations. For example, some aircraft leading edge devices are protected only when retracted. When leading edges are extended during extensive low-speed flight, pilots should pay special attention to their condition.

Tail contamination, especially on T-tail aircraft, must be avoided to ensure adequate elevator control. Attention must be paid to preventing icing on all flying surfaces and any area ahead of engine inlets.

AIRCRAFT HANDLING CONSIDERATIONS

Different handling techniques should be used during go-around situations when aircraft wings are contaminated. This is especially true when the aircraft has built up ice during final approach with icing prevention systems turned off, or with a malfunction of the airfoil ice protection systems. This handling data is not specific to any aircraft type.

A primary objective is to keep the AOA as low as possible. Any increase in AOA may stall the aircraft (remember, a contaminated wing significantly reduces the stalling AOA).

A slower rotation rate allows the aircraft to accelerate to relatively higher speeds and results in lower AOAs. Slower rotation rates increase the probability of a successful go-around.

A higher go around speed also results in lower AOAs and increases the probability of a successful go-around. Remember, lift increases as the square of speed. Consequently, five to ten knots has a significant effect on performance.

PROPELLER VERSUS JET AIRCRAFT

The safety margin with a contaminated wing is greater on a prop than on a jet. The relative performance of a prop is improved because the wing is unswept and the high-energy airflow (propwash) over the upper surface of the wing partly offsets contaminant effects.

On a jet, however, the available performance margin with a contaminated wing is practically zero, for two reasons. First, the upper surfaces have no high-energy flow, and second, at a given AOA the swept wing generates less lift. Higher AOAs are required for swept wings resulting in greater sensitivity to wing contamination.

CONCLUSIONS

The degree of aircraft performance loss from icing is related to how much of the wing leading edge is contaminated. Research and analysis of mishaps resulting from icing have shown that small amounts of contamination significantly affect aircraft performance. This applies to both "hard wing" aircraft and those equipped with leading edge devices.

Safe winter operation requires careful attention to the aircraft to ensure it's free of contamination, especially during takeoff and landing. This assessment must be updated as the environment changes to ensure previous decisions are still valid.

Pulling out of the departure lineup and returning to the ramp for deicing, or an orbit at the outer marker to provide time to deice the tail, may be required to ensure your trip is a safe one. ✈

Adapted from *Airline Pilot*.

The C-130— The "Herk"

...Trash hauler extraordinaire

Preflight activities before a container delivery system (CDS) airdrop mission.

by Lt. Col. Richard L. Buck
Supervising Editor

1st Lt. Iracondo, 61st TAS copilot.

Pilots and navigators mission planning prior to airdrop mission.

On 23 August, 1954, the first Lockheed C-130 took to the sky for its maiden flight. For those of us who have flown the "Herk," that date ranks right up there with wedding anniversaries, wives' birthdays, and first solo flights—not necessarily in that order. There are only a handful of airplanes, especially trash haulers, that elicit this special kind of feeling. The "Herk" is one such airplane.

To get the C-130 story, I drove to Little Rock AFB, Arkansas. I decided on Little Rock, partly because it's easy to get to, but more importantly, because of the diverse variety of C-130 activities at this one location. As I crossed the border from Missouri into Arkansas, I knew I was headed in the right direction. There, low on the horizon, was a flight of five C-130s on a low-level training route. This brought to mind some history of the 'Herk" and how the actual concept evolved.

In 1950, as America was caught unprepared for a major conflict, North Korean troops surged across the 38th parallel and almost pushed allied troops into the sea. Agonizing days and weeks passed until United Nations forces finally arrived to turn things around. As the conflict continued, Department of Defense officials and leaders of the still-new Air Force started to plan for a new cargo plane. They hoped industry could somehow design an aircraft that could haul men and equipment across oceans, drop them, and continue to resupply either by airdrop or airland. The plane they envisioned had to be capable of cruising at "jet speeds" while also being able to drop troops at 125 knots! In 1951 no plane could meet those requirements.

So, on 2 February, 1951, the Air Force issued its General Operational Requirement and Requests for Proposals (RFP) went out to Boeing, Douglas, Fairchild, and Lockheed. What the Air Force asked for was an airplane that was part tramp steamer and part boxcar; part hummingbird and part hawk. It would have to combine the best qualities of a camel, an ox, and a burro. The Air Force was asking for a "super" plane.

Still, on 2 July, five months to the day after issuing its RFP, Air Force officials announced that

THESE TREES THAT SURROUND
THE MEMORIAL WALL WERE
PLANTED BY MEMBERS OF
THE 52ND TACTICAL AIRLIFT SQUADRON
IN HONOR OF FELLOW C-130
AIRMEN WHO DIED IN SERVICE TO
THEIR COUNTRY ON 15 APRIL 1975.
IN MEMORY OF
1LT JAMES M. SIMONITSCH
SSGT GARY A. McVEY
A1C KENNETH T. WASHINGTON
IN MEMORY OF
CAPTAIN LANNY L. EWART
CAPTAIN RONALD J. FAGAN
CAPTAIN THOMAS C. SMITH
CAPTAIN DENNIS D. FABER
CAPTAIN EDWIN M. KAYASHI
2LT MARK D. SHADRIGIAN
SSGT WILLIAM D. RAMSEY
SSGT RANDALL A. WOGEL
8 SEPTEMBER 1975

...in memory of those who made the supreme sacrifice.

62 TAS memorial dedication ceremony.

Lockheed and its Model L-206 had won the competition.

As outlined on the drawing boards at Lockheed's Burbank, Calif., plant, this plane was like no other before it. In order to have instant power when it would be needed most—airdrops, short-field takeoffs, etc.—Lockheed designers decided to go with a strange (for that time) combination powerplant called the turboprop. Extremely efficient, the four Allison T56-A-1As would be linked to three-bladed, variable-pitch propellers to give the ungainly looking airlifter a top speed of 360 miles per hour—"jet speeds."

The airframe design was highly innovative. The long, angular wing sat atop a fuselage that was flattened slightly and roughly the size of a railroad car—10-feet high, 9-feet wide, and 60-feet long. That massive space was also to be pressurized, which was nothing special. Nothing special, that is, until you cut a great big hole in the rear of the tube to allow airdrop of large amounts of machinery and material. Now put that cargo floor only 45 inches above the ground, at truck-bed height to ease your loading problems, and you have a C-130 fuselage.

The landing gear was very unusual. Lockheed opted for a tandem-wheel main gear which retracted into pods on the side of the fuselage. The first low-pressure tire would pack the ground for the second to roll over. Thus, any semihard ground with a texture approaching that of loose sand could be used for landing.

A roomy "green house" of a cockpit was designed to give the crew an almost unobstructed view of the runway—20 degrees of downward visibility, to be exact. This openness, again unusual for a cargo airplane of that time, became a trademark for the

"Herk" and resulted in the characteristic A-model "Roman nose."

When the prototypes were rolled out, Lockheed designers had surpassed their own estimates. The YC-130 weighed in at a mere 108,000 pounds instead of the originally proposed 113,000 pounds. The empty weight of the first "Herk" was a feather-like 57,000 pounds. When coupled to 15,000 horses, the prototype was almost bound to leap off the ground.

Finally, the anticipation was over. On 23 August, 1954, Lockheed test pilot Stanley Beltz guided the aircraft, the first of many, into the air over Burbank. The legend of the C-130 began.

The legend—at least my part of it— continued the day after my arrival with a four-ship tactical training mission flown by the 61st Tactical Airlift Squadron. Mission planning, briefings, route study (to include known threat avoidance tactics), and preflight went like clockwork. During a lull in the action-packed routine, 1st Lt. Charles M. Iracondo, one of the squadron copilots, discussed some of the missions of the C-130. "The C-130 is a very versatile aircraft. Besides the usual airdrop and airland missions that most people are familiar with, the C-130 does LAPES (Low Altitude Parachute Extraction System), HALO (High-Altitude/Low-Opening), and SOLL (Special Operations, Low Level). Additionally, there are 130s that drop flares, land on ice and snow with skis, and fight fires just to name a few." To list all the possible missions and uses of the C-130, not to mention the active duty, AFRES, and ANG units which fly the "Herk" (along with their locations) would take more room in *TMF* than we have pages. Suffice it to say, MAC has found as many missions for the C-130 as our users have devised ways to employ this highly versatile air machine.

Training a C-130 crewmember is an intricate process involving the scheduled coordination of many agencies. A student first enters the academic and simulator portions of the basic course, done by contract, and taught by the Link Training Services Division, a subsidiary of C.A.E. Industries, Ltd. The student then progresses to the 16th Tactical Airlift Training Squadron for the first phase of C-130 aircraft training—basic aircraft qualification. Following this, the student goes back to the contract folks for the second phase of academics and simulator. Then it's on to the 62d Tactical Airlift Squadron for the flying portion of the second phase consisting of tactical airland and airdrop qualification. Generally, pilots will return to Little Rock for upgrade to aircraft commander. Training consists of academics and simulator by contract people and basic and tactical qualification in the aircraft. All crew positions return for upgrade to instructor. In addition to upgrade training, Link contractors conduct annual simulator refresher training, annual instrument refresher course, and MOST (Mission Oriented Simulator Training). I was fortunate to be able to observe a MOST mission and talk to crewmembers about the training. The concensus was unanimous—MOST simulator training is of immense value as a tool to facilitate aircrew coordination.

The majority of continuation training in the C-130 is done at the individual unit. There are a number of advanced tactical schools in existence, however. One such organization, the 34th Combat Aircrew Training Squadron (CATS) at Little Rock AFB, supports MAC's role in the Joint Readiness Training Center's (JRTC) arena. MAC's participation in the JRTC provides realistic combat training supporting light forces in a low-to-mid intensity conflict and in a threat environment which varies from low to high. Specific MAC objectives include: training in day/night, chemical/biological, and electronic warefare threat environments for both aircrew and ground support participants; development and validation of tactics and defense systems in response to present and future threats; test and refinement of joint command and control and operational doctrine and procedures; and, interfly with fighters for both escort and opposition attack. MAC has consistently strived to use the C-130 in a safe and efficient manner, to the limit of its operational capability. MAC's cooperation with the JRTC shows the commitment to advanced strategies and tactics is ongoing.

My travel to Little Rock was intended as a fact-finding trip to gather the latest data on C-130 history, aircrews, units, missions, training, and future. Prior to leaving, I was honored to witness the dedication of a memorial in front of the 62d Tactical Airlift Squadron. The memorial is dedicated to unit members who have given their lives in the line of duty. The proud heritage of the C-130 community shone on the faces of those gathered for the ceremony. Who could have possibly predicted, back in 1954 when the first C-130 took to the sky, the number of conflicts where the venerable aircraft has played a key role in determining the outcome. The dedication was more than merely a remembrance of those who had gone before. It was a celebration of the proud tradition that is ours as C-130 crewmenbers and of the future of C-130 airlift. Like the mythical hero the airplane was named after, the labors of the C-130 have never ended.

1990 MAC Safety

MAC Flight Safety Achievement Award

(Colocated units share in the award.)

Category I	Category II	Category III
62 MAW & 446 MAW (Assoc)	10 MAS	Det 5, 37 ARS
314 TAW	13 MAS	Det 7, 37 ARS
374 TAW	37 ARS	Det 8, 37 ARS
375 MAW & 932 AAG (Assoc)	38 ARS	Det 1, 1400 MAS
435 TAW	41 ARS	Det 2, 1400 MAS
436 MAW & 512 MAW (Assoc)	53 WRS	Det 5, 1400 MAS
437 MAW & 315 MAW (Assoc)	55 WRS	Det 1, 1401 MAS
443 MAW	58 MAS	Det 2, 1401 MAS
463 TAW	61 MAG	Det 3, 1401 MAS
1550 CCTW	71 ARS	Det 4, 1401 MAS
	616 MAG	Det 1, 1402 MAS
	1400 MAS	Det 3, 1402 MAS
	1402 MAS	Det 4, 1402 MAS
		Det 1, 1403 MAS

MAC Distinguished Flight Unit Safety Award

Category I	Category II	Category III
375 MAW	53 WRS	Det 2, 1401 MAS

MAC Trophy For Flight Safety

ARS

MAC Ground Safety Achievement Award

(Colocated units share in the award.)

Category I	Category II			Category III	
7 WW	1 AES	55 WRS	834 SVCSQ	Det 1, 1 WW	Det 5, 1400 MAS
62 MAW	2 AES	57 AES	834 MSSQ	OL-A Det 5, ARS	Det 1, 1401 MAS
436 MAW	9 AES	61 MAG	834 SUPS	Det 9, 4 WW	Det 2, 1401 MAS
438 MAW	11 AAS	71 ARS	834 TRSQ	Det 10, 5 WW	Det 3, 1401 MAS
443 MAW	13 MAS	313 APS	1375 FTS	Det 7, 37 ARS	Det 4, 1401 MAS
463 TAW	37 ARS	375 SPS	1401 MAS	Det 3, 625 MASG	Det 1, 1402 MAS
	38 ARS	375 SUPS	1402 MAS	Det 1, 1361 AVS	Det 3, 1402 MAS
	41 ARS	616 MAG	1467 FCS	Det 1, 1400 MAS	Det 4, 1402 MAS
	53 WRS	834 COMPSQ		Det 2, 1400 MAS	AFRCC

(Designations and locations current during awards cycle.)

Awards Winners

The Lamar F. Renfro Award for Ground Safety

Category I	Category II	Category III
463 TAW	313 APS	Det 3, 625 MASG

The Commander in Chief's Trophy for Ground Safety

22 AF

MAC Services/Airlift Divisions Ground Safety Trophy

AAVS ARS AWS

MAC Support Safety Achievement Award

2 MAPS 7 MAPS 603 MASG 605 MASS 611 MASG 624 MASG 628 MASS

MAC Explosives Safety Award

38 ARS	436 MAW	438 MAW	619 MASS
62 MAW	437 MAW	608 APS	834 ABW

MAC Safety Officer of the Year Awards

Primary Duty

Maj. James C. Runk
436 MAW

Additional Duty

Capt. John W. Blumentritt
71 ARS

MAC Safety NCO of the Year Awards

Primary Duty

TSgt. Mary M. Rowe
619 MASS

Additional Duty

TSgt. Lorette A. Cox
41 ARS

CHECKLIST DISCIPLINE

A high speed rejected takeoff results in disaster.

Runway departures following high speed rejected takeoffs (RTO) have been evident in the past and continue to result in numerous aircraft mishaps. Although most rejected takeoffs are initiated at low speeds (below 100 knots) and are executed without incident, the potential for a mishap following an RTO initiated at high speed remains high.

FLIGHT HISTORY

About 1400 hours EDT on 20 September 1989, the Captain and First Officer (FO) reported to USAir operations at Baltimore-Washington International Airport (BWI) for a Boeing 737-400 flight to LaGuardia Airport, New York (LGA) as USAir Flight 1846. Scheduled departure from BWI was 1510, but traffic inbound to LGA delayed the takeoff until 1935. Flight 1846 arrived at LGA's Gate 15 at 2040.

Weather and air traffic in the LGA terminal area caused cancellations and delayed most flights for several hours. While on the ground, the Captain went to USAir operations and returned to the aircraft expecting to fly to Norfolk, Va. However, the dispatcher decided to cancel the Norfolk leg, unload passengers, and to send the flight to Charlotte, N.C. (CLT). Several minutes later, the dispatcher told the Captain, contrary to his previous decision, that his airplane would indeed carry passengers to Charlotte as USAir Flight 5050. This change upset the Captain, who expressed concern because more delays would cause him and the FO to exceed crew duty day limits. While passengers were boarding, the Captain visited USAir's ground movement control tower to inquire about how decisions were made concerning flights and passengers.

During the Captain's absence, the FO stayed in his cockpit seat. He placed new pages for a chart/approach plate holder on the center pedestal, then put the pages into the holder on his lap. Meanwhile, a Pan Am pilot entered the cockpit and sat down facing crosswise on the auxillary jump seat behind the Captain's seat. The Pan Am pilot said someone from USAir entered the cockpit and gave the crew a single-sheet weather chart that was eventually placed on the center pedestal. Several other persons were also in the cockpit at various times before departure.

The Captain returned to the cockpit as the last passengers were boarding. After the jetway retracted, a passenger service representative told the Captain, through the open cockpit window, he needed to board more passengers. The Captain refused to open the door, and Flight 5050 left the gate at 2252.

The flight crew described engine start and taxi to Runway 31 as uneventful. Six to eight airplanes were ahead of them awaiting takeoff clearance. Two minutes after push-back, the ground controller told the crew to hold short of taxiway Golf-Golf. However, the Captain failed to hold short and received modified taxi instructions from ground control. The Captain briefed takeoff speeds as V_1: 125 knots, V_r: 128 knots, and V_2: 139 knots. The Captain had flown the BWI-LGA segment, and the FO intended to fly the LGA-CLT segment. As the pilot flying, the FO's departure briefing consisted of reciting to the Captain his turn

and altitude clearance, and the LaGuardia-3 departure.

About two minutes later, the FO announced "stabilizer and trim" as part of the before-takeoff checklist. The Captain responded with "set" and then corrected himself by saying: "Stabilizer trim, I forgot the answer. Set for takeoff." According to USAir's B-737-400 normal procedures checklist, "set for takeoff" was the correct response.

Flight 5050 was cleared into position at the end of the runway at 2318:26 and received takeoff clearance at 2320:05. The cockpit voice recorder (CVR) disclosed the sound of increasing engine noise, and shortly thereafter, the FO pressed the autothrottle disengage button instead of the takeoff/go-around (TO/GA) button. He later said he pressed the TO/GA button, but noted no throttle movement. He then advanced the throttles manually to a "rough" takeoff-power setting. The Captain said, "Okay, that's the wrong button pushed," and nine seconds later, continued: "All right, I'll set your power." The Captain later stated he thought he had rearmed and reengaged the autothrottles and had advanced the throttles to the N1 target setting of 95 percent, while depressing the TO/GA button. The FO later explained that to him "I'll set your power" meant the Captain was "fine-tuning" the setting to takeoff thrust. Both crewmembers agreed the airplane began tracking to the left during the takeoff roll. About 18 seconds after begining the roll, the CVR recorded a "bang" followed shortly by a loud rumble. The Captain later recalled that during this time the airplane continued tracking left and he became concerned about the unidentified bang and rumble. The FO said he believed he had stopped the leftward tracking and the airplane "began to parallel runway centerline."

At 2320:53, the CVR recorded the Captain saying "got the steering." Hearing this, the FO said "Watch it then," and began releasing force on the right rudder pedal but kept his hands on the yoke in anticipation of the V_1 and rotation calls.

At 2320:58.1, the Captain said: "Let's take it back then" which he later testified meant he was aborting the takeoff. According to the Captain, he rejected the takeoff because of the continuing left drift and rumbling noise. The CVR recorded the sound of throttle levers hitting their idle stops at 2320:58.4. According to data from the digital flight data recorder (DFDR), indicated airspeed at that time was 130 knots (5 knots above go speed). The sound of engine noise decreasing was recorded at 2321:00.9. The FO informed Tower of the rejected takeoff.

The CVR recorded increasing engine sound indicating use of reverse thrust almost nine seconds after the abort maneuver began. The airplane didn't stop on the runway but crossed the end of the 100-foot overrun with 34 knots ground speed. It came to rest in the water, supported by the pier holding Runway 13's approach lights. The sound of impact was recorded at 2321:21.9.

The fuselage separated into three sections with the forward section resting on part of the elevated light stanchion and the aft section partially submerged. Fragments of the pier penetrated the cockpit floor near the Captain's rudder pedals. Both pilots and four cabin crewmembers suffered minor injuries. Of the 57 passengers, two were killed and 15 injured.

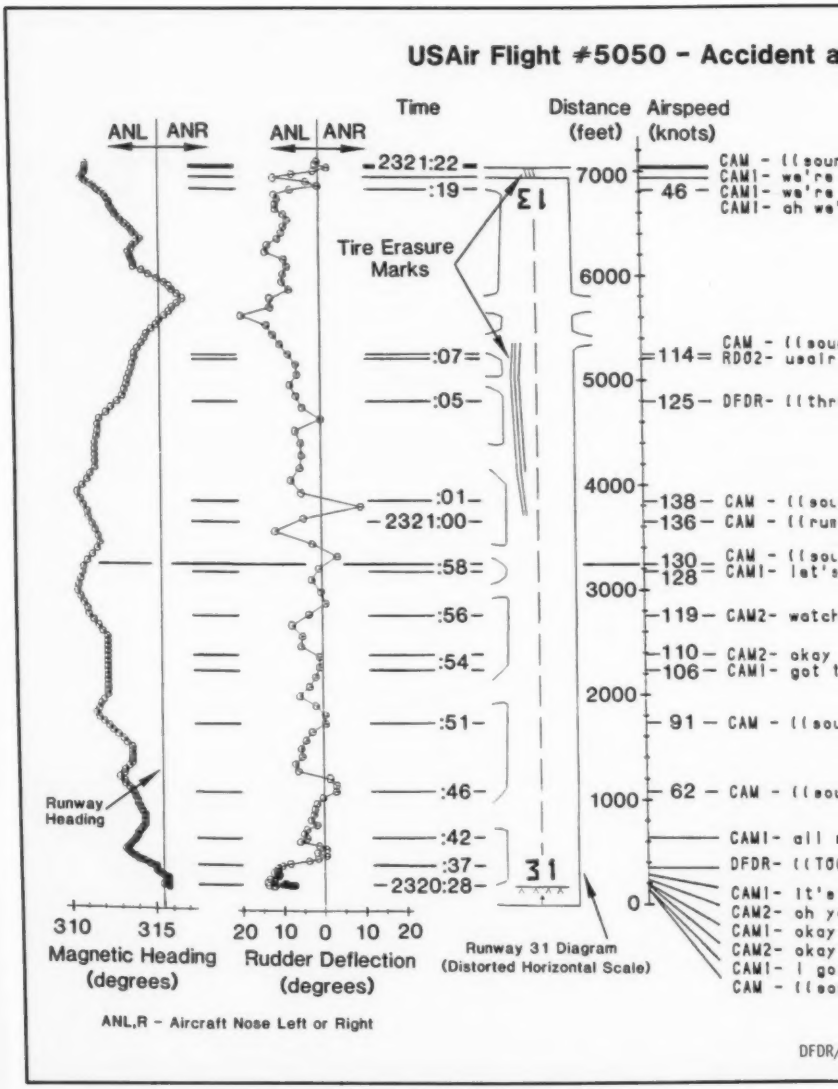
ANALYSIS

Investigation showed both flight and cabin crewmembers were qualified to perform their duties. The pilots were well rested prior to the start of their crew-duty day and recalled no personal matters hindering their flying.

There was no evidence to suggest pre-existing structural discrepancies, flight-control system, or engine anomalies contributed to the accident. Evidence indicates that a takeoff attempt with full left rudder trim precipitated the accident. Investigation also showed the airplane was controllable with full left rudder trim and could have flown with the appropriate application of available flight controls. Lastly, the investigation showed the airplane could have been stopped on the runway after the takeoff was rejected.

Data from the DFDR showed that rudder trim was neutral after arrival at the USAir gate at LGA. The DFDR subsequently stopped recording when engines were shutdown. When repowered after engine start for Flight 5050, the DFDR indicated that the rudder had moved to the full left (15.9 degrees) trim position. Electrical and hydraulic power from the APU were available during the ground time to change rudder trim position, if commanded. Time required to run the trim from neutral to full left is about 30 seconds. Thus, momentary knob rotation would not have produced full left trim.

The raised-blade design of the knob and its unguarded location at


USAir Flight #5050 - Accident a
ANL ANR
ANL ANR
Time
Distance (feet)
Airspeed (knots)
2321:22
:19
Tire Erasure Marks
:07
:05
:01
2321:00
:58
:56
:54
:51
:46
:42
:37
2320:28
7000
6000
5000
4000
3000
2000
1000
0
46
114
125
138
136
130
128
119
110
106
91
62
Runway Heading
310 315
Magnetic Heading (degrees)
20 10 0 10 20
Rudder Deflection (degrees)
Runway 31 Diagram (Distorted Horizontal Scale)
31
ANL,R - Aircraft Nose Left or Right
DFDR/

nt at LaGuardia Airport, Flushing NY

DFDR/CVR information.

the edge of the center pedestal made it vulnerable to inadvertent actuation by a person in the jump seat who could have pushed the knob counterclockwise with his or her foot. Although the visiting pilot said he didn't use the center pedestal as a footrest, either he or other individuals had the opportunity to inadvertently rotate the knob. Also, an object placed on the center pedestal could have wedged against and rotated the knob to drive the trim out of neutral. It is possible that the rudder trim knob was momentarily moved and jammed out of neutral from debris underneath or by internal malfunction. Either occurrence was unlikely since the knob operated satisfactorily after the accident.

The Captain should have noticed the misaligned rudder trim immediately after engine start and before he began taxiing from the gate, since the rudder pedals were offset from each other by 4½ inches. He didn't mention the offset to investigators until two days after the accident. After the DFDR evidence indicated a trim anomaly, he claimed he noticed the offset pedals, adding that the offset didn't bother him because he was used to taxiing with offset pedals in the C-130. The C-130 rudder control system is reversible; air loads acting on the rudder can cause rudder movement which will feed back through the control system to move the rudder pedals. It is normal, when taxiing a C-130, for rudder pedals to move as a crosswind acts on the rudder. However, the B-737 control system is irreversible; air loads on the rudder will not cause rudder or rudder pedal movement. While the Captain was relatively inexperienced in his position, he should have been aware of the different airplane characteristics. Even in a C-130, it would be unusual for the pedal position to remain at a constant offset as the airplane changed direction during taxi.

The Captain had more than 2,600 flight hours in B-737s, 140 of them in the left seat. Since taxiing is performed only from the left seat, his taxi experience was limited. Full rudder trim, however, would also turn the nose wheel about 4-degrees left, requiring the Captain to make a constant correction with nosewheel steering to stay on a straight taxiway.

The "Before Takeoff" checklist requires the Captain to look at trim indicators for stabilizer, rudder, and aileron position in response to the FO's challenge, "Stabilizer and Trim." The intent of this step is to detect misset trim. Although the Captain said he looked at all three indicators during taxi-out, his response: "Stabilizer trim, I forgot the answer. Set for takeoff," suggests that not only was he unfamiliar with the response, but he may have been unfamiliar with which items to check. This was a critical opportunity to notice the misset rudder trim, but the Captain failed to do so. The possibility that he looked at the rudder trim indicator and saw a stuck marker reading "0" is remote as the indicator worked when tested later.

The Safety Board believes the Captain should have noticed the mistrimmed rudder when he first rested his feet on the offset pedals; during taxi when he had to move rudder pedals or the nosewheel steering tiller to correct the left turning tendency; or during the rudder-control freedom-of-movement check.

The FO would have been unlikely to notice the offset pedals until he took control for takeoff. He testified he noticed the pedal offset on the runway and needed more right pedal to maintain runway heading as the airplane accelerated. According to the CVR, neither pilot mentioned pedal offset. The First Officer's inexperience in the B-737-400 (8.2 flight hours) may explain his failure to recognize and act upon the anomaly in time to change the outcome.

Rudder trim on the B-737 can be overpowered by a pilot. Yawing moments caused by rudder deflection will increase with increased airspeed, but even with full trim, the rudder can be deflected to a position fully opposite to trim by application of force on the rudder pedals. Upon reaching a speed at which the rudder is aerodynamically effective, rudder pedals alone can be used to keep the airplane rolling straight. At lower speeds, nosewheel steering must be used.

DFDR data confirms the FO applied some force on the right rudder pedal as the airplane accelerated for takeoff. This force was insufficient as the rudder became more aerodynamically effective, and at 91 knots, the nose veered left. At 106 knots the CVR recorded the Captain saying, "got the steering." The FO testified he thought the Captain said, "I got the steering" and he expected the Captain to take control of the rudder. The FO then said "okay" and at 110 knots, gradually relaxed force on the right pedal to prevent rapid veering to the left. The rudder changed from about 1-degree to 8-degrees left, consistent with the FO's statement that he relaxed force on the pedal.

The FO testified he never felt the Captain overpower his rudder pedal force. At 119 knots and fewer than three seconds after the comment "got the steering," the DFDR shows the airplane swerved left. Apparently, neither pilot was fully in control of the airplane, as

both seemed to expect the other to steer.

When the Captain took control of the airplane to initiate the reject, he faced an unknown and complicated directional control situation. The need for a large amount of force on the right rudder pedal at such a critical time was probably a complete surprise to the Captain. The Captain was relying on nosewheel steering tiller for directional control instead of the rudder pedals. The combination of tiller use and failure to detect the FO's rudder commands, apparently led the Captain to falsely believe the tiller was effectively maintaining directional control.

Most of the RTOs which result in runway overrun accidents are initiated for reasons other than engine failure, and in many cases, the rejects are not necessary because the airplanes are capable of taking off safely. The Captain had several indications of a problem during takeoff roll before reaching 100 knots. First, he must have been aware of the FO's difficulty in maintaining runway heading as more and more nosewheel steering inputs were made; second, the sound of a "bang" occurred at 62 knots and rumble noise heard at 91 knots. The Safety Board believes the Captain should have rejected the takeoff immediately. Having failed to do so, he must have been aware the airplane was accelerating and rapidly approaching V_1 speed, even though he failed to make the 80 knots and V_1 callouts. Realizing this, he should have given his total attention to control of the airplane using rudder pedals and continued the takeoff. Although physically capable, neither pilot used substantial right rudder to maintain directional control. They had full rudder authority; a safe takeoff was possible; and they could have corrected the mistrim condition after lift-off.

The order of actions in a rejected takeoff are: full braking, throttle reduction, extending spoilers, and applying reverse thrust when available. When the Captain took control to reject the takeoff, he should have corrected the leftward tracking and applied maximum braking without delay. The DFDR thrust and rudder position data indicated the Captain relied only on differential braking and nosewheel steering to correct heading. Maximum deceleration wasn't achieved until 5½ seconds after initial RTO action was taken, whereas aircraft flight manual data assumed an increment of only one second from brake application to achieving maximum deceleration. The Safety Board's calculations assumed a reaction time of 2½ seconds from brake application to maximum braking. The additional three seconds delay added 786 feet to the theoretical stopping distance required. The Safety Board concluded Flight 5050 could have stopped on the 7,000-foot runway had the Captain taken timely actions to achieve maximum braking after his decision to reject.

Lack of a comprehensive departure briefing and of airspeed callouts, failure of the FO to clearly communicate his directional control problem, and the casual manner in which the Captain communicated his intent to reject the takeoff are indications of poor cockpit coordination. The pilots of Flight 5050 were ineffective as a team. The Captain's briefing on departure and emergency procedures was inadequate. Having never flown with the FO, the Captain couldn't be familiar with the FO's capabilities. At LaGuardia, the Captain should have been aware of the need for a discussion of emergency procedures. LGA was the FO's first non-supervised takeoff in line operational status. Adverse conditions included: darkness, low ceiling, a wet, relatively short runway with no appreciable overrun, and water off the departure end of the runway. These factors categorized the takeoff as nonroutine and should have prompted the Captain to review rejected takeoff procedures. USAir does not require a discussion of emergency procedures during departure briefings. In this case, however, good airmanship dictated such a discussion. The Captain might have even flown the takeoff himself since the FO lacked experience in the B-737 under such conditions.

PROBABLE CAUSE

The National Transportation Safety Board determined the probable cause of this accident was the Captain's failure to exercise command authority in a timely manner to reject the takeoff or take sufficient control to continue the takeoff, which was initiated with a mistrimmed rudder. Also causal was the Captain's failure to detect the mistrimmed rudder before attempting the takeoff.

APPLICATION TO MAC

Full rudder trim during takeoff doesn't make an accident inevitable. Pilots are trained to maintain directional control under adverse conditions such as yaw from an engine failure.

During critical mission operations, positive crew coordination and communications are necessary for success. In the rush to get a mission airborne, there is always that last chance to catch a checklist error—if the checklist is used as designed.

Adapted from *NTSB/AAR-90/03.*

Flying-Hour Milestones

10,000

445 MAW
MSgt. Saul Hershkowitz

446 MAW
Col. Franklin A. P. Frenette

7,500

772 TAS
TSgt. Eduardo Gonzalez

5,000

HQ MAC/QSS
Maj. Robert D. Vanderhoeven

144 TAS
Col. Thomas J. Gresch
Col. Jerry P. Jones
Lt. Col. Steve L. Gilbertson
Maj. Lance G. Carey
Maj. Michael C. Post
Maj. Michael A. Kelley
SMSgt. Kenneth W. Jackson
MSgt. John K. Forbes, Jr.

210 ARS
Maj. Allan R. Olsen

445 MAW
Maj. Randall A. Hansen
MSgt. Kenneth Ernzen
MSgt. Maxwell Tena

773 TAS
MSgt. James A. McCain
TSgt. Paul J. Kitchen

2,500

11 AAS
Capt. Jack C. Gundrum

17 MAS
Capt. Randolph M. Knox

41 MAS
TSgt. Eric S. Gray

57 AES
SSgt. Al R. Jean Batiste
SSgt. Daniel H. Little
Sgt. Loretta L. Provost

144 TAS
Capt. Gary E. Lee
MSgt. Terence V. Pallas
TSgt. Benjamin J. Grunwald
TSgt. Gary K. Lanham

166 TAG
TSgt. Peter P. Sokolovich

210 ARS
Maj. Richard M. Hawkins
Maj. David G. Hoffman
Capt. Philip E. Bray
Capt. Thomas G. Williams
1st. Lt. Guy G. Hudson
MSgt. Henry T. Bruneau, Jr.
TSgt. John S. Filo

445 MAW
Capt. Robert K. Blaha
Capt. Precht Galloway
Capt. Kevin V. Lacy
Capt. Tobin Rower, III.
Capt. Thomas G. Thompson
TSgt. Michael Forinech
TSgt. Randy T. Griggs
SSgt. Timothy G. Ellis
SSgt. Donald M. Hallwachs

463 TAW
Col. Burton V. Hammond, III.
Col. Ronald T. Sampson

772 TAS
Maj. Charles R. Greenway
Maj. David E. Roberts
Capt. Anthony D. Jones
SSgt. Thomas J. Asewicz

773 TAS
Maj. Laurence A. Fariss
Maj. Robert M. Keele
Capt. Glen M. Thompson, Jr.
Capt. Guy A. Schmidt
Capt. Cecil L. Ross
Sgt. James C. Goodman

907 TAG
TSgt. Robert N. Wanner, Jr.

Det 5, 1400 MAS
Lt. Col. Ronald L. Beesley

Det 4, 1402 MAS
Capt. Richard W. Milliken

1467 FCS
MSgt. Jerome D. Vares

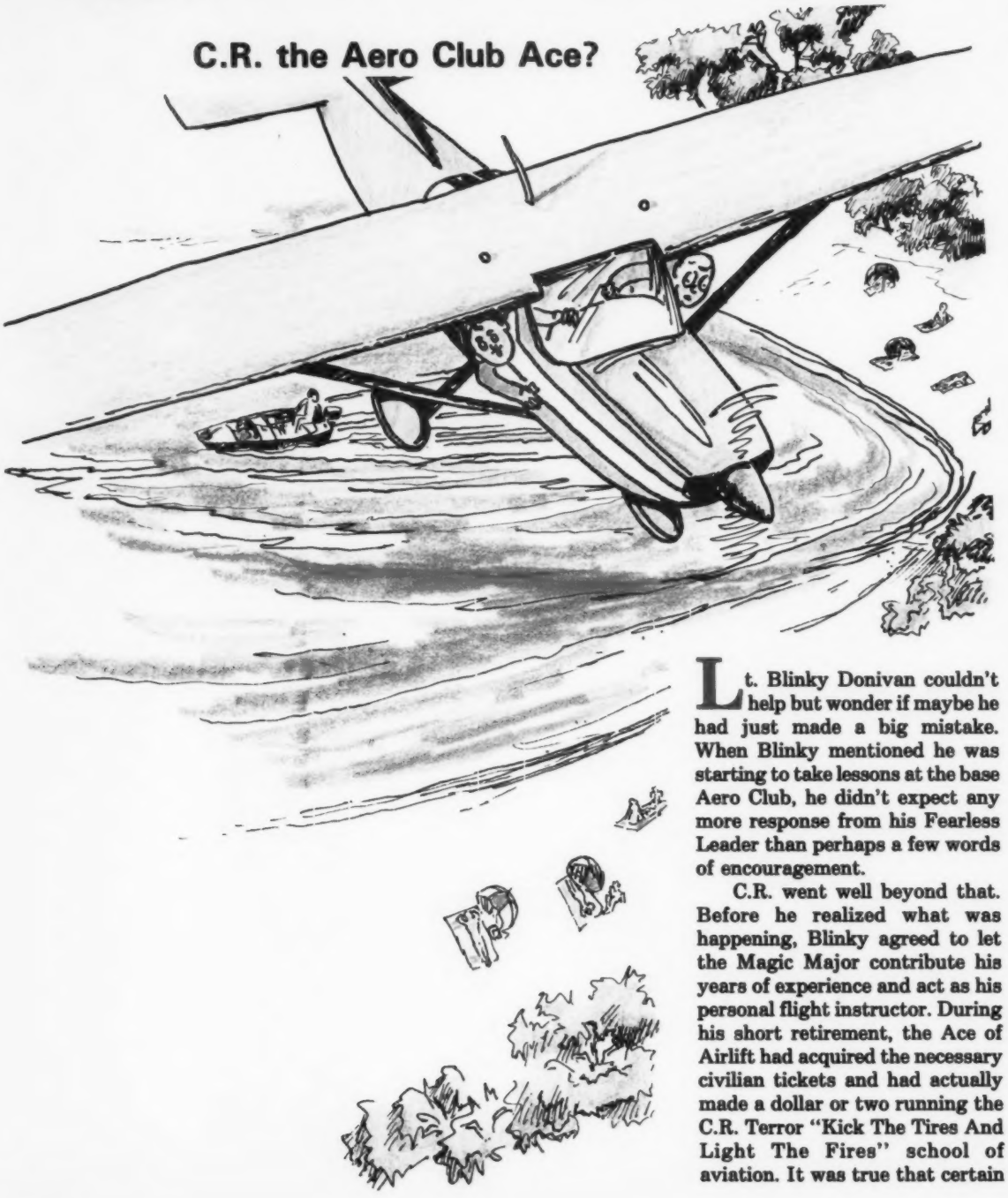
1,000

Capt. Timothy R. Grams
Capt. Albert V. Lupenski
TSgt. John R. Silsbee
TSgt. Michael R. Weber
SSgt. Clark A. Ahola

Ranks and units are those at time of award.

C.R. TERROR

C.R. the Aero Club Ace?



Lt. Blinky Donivan couldn't help but wonder if maybe he had just made a big mistake. When Blinky mentioned he was starting to take lessons at the base Aero Club, he didn't expect any more response from his Fearless Leader than perhaps a few words of encouragement.

C.R. went well beyond that. Before he realized what was happening, Blinky agreed to let the Magic Major contribute his years of experience and act as his personal flight instructor. During his short retirement, the Ace of Airlift had acquired the necessary civilian tickets and had actually made a dollar or two running the C.R. Terror "Kick The Tires And Light The Fires" school of aviation. It was true that certain

shortsighted people thought the increase in FAA violations plaguing the little airport C.R. had been working out of had something to do with his teaching techniques. That was most likely simply a case of professional jealousy.

Since recall, C.R. had "bowed out" of the general aviation flight instructor business. Blinky's interest, however, presented an opportunity to regain currency. Besides, he might be able to get the inside scoop on how well the ongoing romance between Blinky and cousin Betty Lou Terror (B.L.T. for short) was progressing.

Early next morning, C.R. parked his faded green Jaguar near the Aero Club's hangar and, within a few hours, had convinced Ralph Macer, club manager, to add his name to the list of authorized instructors. Ralph, new to civil service, wasn't fully aware of the Magnificent One's many misadventures. As luck would have it, the club was short of instructors and Ralph had never met anyone with over 45,000 flying hours. He couldn't imagine anyone with that many hours doing anything really dangerous. The instructor check in a Cessna 152 had gone very well, other than some reduced performance from the aircraft which could be attributed to Ralph's and C.R's combined weight (both had gained a few pounds recently).

By the time Blinky arrived for his first lesson, C.R. had been cleared for the flight and had spent a good 25 minutes flirting with Sandy, the Club Secretary.

After what seemed to Blinky to be a remarkably short prebrief, the Dynamic Twosome left the safety of the clubhouse and, finding their way around a group of cub scouts on an orientation tour, headed for a nearby Cessna.

"Blinky m'lad, the first thing you need to discover is how to do a proper preflight. I have in my hand, the official aero club checklist to achieve this task. As you can see, it's a comprehensive document ensuring the aircraft is ready to fly. Of course, by the time you accumulate as many hours as I have, a written checklist is no longer required; memory does the trick. So, to expedite matters I'll just look things over."

"C.R., are you sure that's a good idea? Isn't this a good opportunity to give me some OJT on checklist use?"

"Tut, Tut, Blinky, all in time. Today's ride need not be encumbered with details; one quick walkaround to ensure no stray tiedowns or wheel chocks are attempting to foil us, and we'll be on our way."

Experience having taught Blinky that any attempt to change C.R.'s mind was seldom successful, he only shook his head and made his way to the cockpit door.

Minutes later, Blinky discovered just how small the cockpit of a "152 is—especially when the person in the other seat is taking up more than half the available space. In fact, it appeared the only way for Blinky to comfortably buckle his seat belt would be for him to enter the cockpit first. But, gentle soul that he is, Blinky didn't want to say anything that could be considered offensive—especially since C.R. might end up being Blinky's cousin-in-law.

The relationship between Blinky and B.L.T. had developed quite nicely. In fact, part of the reason Blinky decided to get his private pilot's license was so he and B.L.T. could take weekend trips to her hometown using aero club airplanes. The roads to Boonsville weren't very good, but the town did have a Cessna-sized airfield.

"Blinky, m'lad, give ground control a call and ask for our taxi clearance. Make sure you tell them we have the current ATIS—information Bravo—and request a departure to the south. Whatever you do, don't tell'm you're a student pilot. If you do, they'll put ya on the bottom of the priority list."

"In ground school, they said it was a good idea to let ATC know your student status," replied Blinky.

"Nonsense, m'boy. Did you intend to hold here until your medical expires? Many ATC types seem overly cautious when it comes to student's capabilities, and we end up waiting."

Reluctantly following C.R.'s instructions, Blinky made the required call to ground control and, after receiving the proper authorization, the Deadly Duo cranked up the Cessna's mighty engine and made their way to the hold line. Upon arrival at the appointed spot, C.R. commenced an abbreviated engine run, instructing Blinky to ask for an immediate departure. Much to C.R.'s surprise and Blinky's concern, Tower responded with an "Immediate takeoff approved, inbound traffic on final."

"Gadzooks, let's be on our way," responded C.R. pulling onto the runway. Lining up more or less on centerline, he turned to Blinky and announced, "Your controls m'lad, full throttle and rotate at 50 knots."

Within seconds the "152 had attained takeoff speed and, as directed, Blinky pulled back on the yoke. The Cessna responded by

leaping into the air—so much so that, within seconds, the pint-sized plane gained significant height and promptly sounded its stall-warning horn while continuing to climb.

"Nose down Blinky, nose down! A "152 is not capable of vertical acceleration."

"Boss, I am pushing the nose down. Something is fighting me."

A quick glance inside the cockpit by the Ambivolent Aviator revealed the elevator trim wheel in other than the takeoff range. It was set in the full nose up position. C.R.'s hurried spin of the trim control wheel allowed normal pitch to be achieved, silencing the stall warning horn. "Blinky, I can't believe it! There's no reason for anyone to trim this air machine to full nose up. Someone must have played with the controls on the ground."

"Right Boss, I remember seeing some cub scouts inside the plane. Maybe one of them altered the controls. Isn't elevator trim setting somewhere on the checklist?"

With a small flush of redness about his rotund face, C.R. answered "I'm sure it is, we'll talk about it on the ground."

The flight proceeded normally and soon the duo arrived at the official aero club training area. For the next 20 minutes or so, C.R. and Blinky stumbled through the standard basic maneuvers. For his first time at the controls, Blinky did rather well. In fact, he did so well that C.R. decided they could afford to terminate the lesson and take a small side trip to a "scenic area" familiar to C.R., just a few miles outside the training area.

As the plane headed further south, C.R., once again at the controls, started a slow descent, leveling off at 500 feet AGL, (the authorized minimum altitude over unpopulated areas). Shortly after level off, Blinky sighted a medium-sized lake at 12 o'clock and noticed a small beach area with a raft and roped off swimming area midway down the left shoreline. "Now Blinky, I want you to pay close attention to the private campgound on the left. I was thinking about taking Tassels there next weekend."

This said, C.R. started a pass down the center of the lake. As the people on the shoreline came into view, Blinky was surprised to see some of them heading for the tree-line while others came down to the waterfront and started to wave. "C. R., why would some of those people run from us? They act like they've got something to hide."

"Blinky, I'll drop down a little bit more and you take a good look as we pass by." C.R. flew the plane to an altitude that most certainly wasn't authorized, and suddenly, Blinky realized why some of those on the beach had headed for cover.

"Boss, those people don't have any clothes on! A lady who looks exactly like Miss October is waving her arms off, like she's trying to tell us something. LOOKOUT! POWER LINE DEAD AHEAD!"

C.R. shoved the throttle full open, and with a groan, pulled back on the yoke hard enough to put the Cessna immediately on the outer edge of its limited performance envelope. Much to Blinky's surprise and delight, the plane missed the wires cutting across the last third of the lake—not by much—but it did miss.

"Well, I guess we know what she was trying to tell us. Apparently we aren't the first ones to do a 'fly by' at 'Nature's Acres Resort and Campground'."

The trip back to the base was just long enough for both crew-members to get their blood pressures back down to normal, and with the expected level of assistance, Blinky made his first landing.

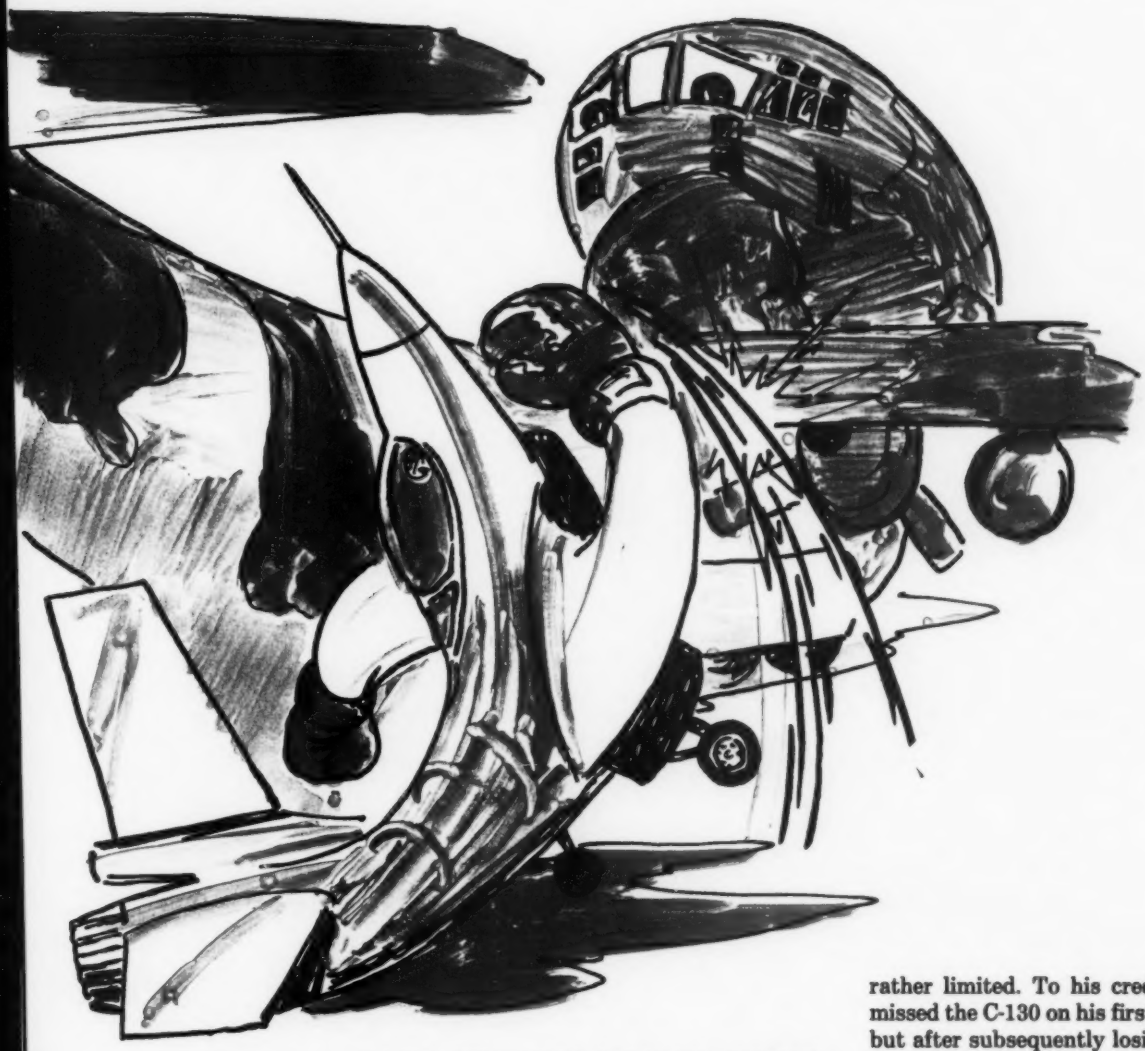
"Blinky m'boy, not a bad landing for your first time at the controls. You did start your flair a little early—in fact, that was the first time I've ever been able to look the pigeons roosting on top of Hanger One straight in the eye. Other than that, it wasn't bad at all."

As they pulled onto the aero club ramp, Blinky sighted Mr. Macer and Col. Heron, the Base Commander, standing near the fuel pumps; they didn't look happy. B.L.T. was standing near-by as well; she didn't look happy either.

Mr. Macer was the first to reach the plane. The colonel and B.L.T. waited in the background. "Major Terror, I'm afraid we've had a complaint about your flight. Someone from 'Nature's Acres' called the base commander about some unauthorized low-level activity. I told the colonel it couldn't be our plane because they're outside of our training area. You wouldn't know anything about this, would you?" Before C.R. could answer, Mr. Macer added, "By the way, the young lady overheard the colonel and I talking, and she made some comment about 'He'd better not have'."

Blinky was first to respond. He simply looked over at C.R. and said, "Boss, I think my flying career and love life have both suffered a major setback."

QUICKSTOPPERS



BUT I'M ON YOUR SIDE!

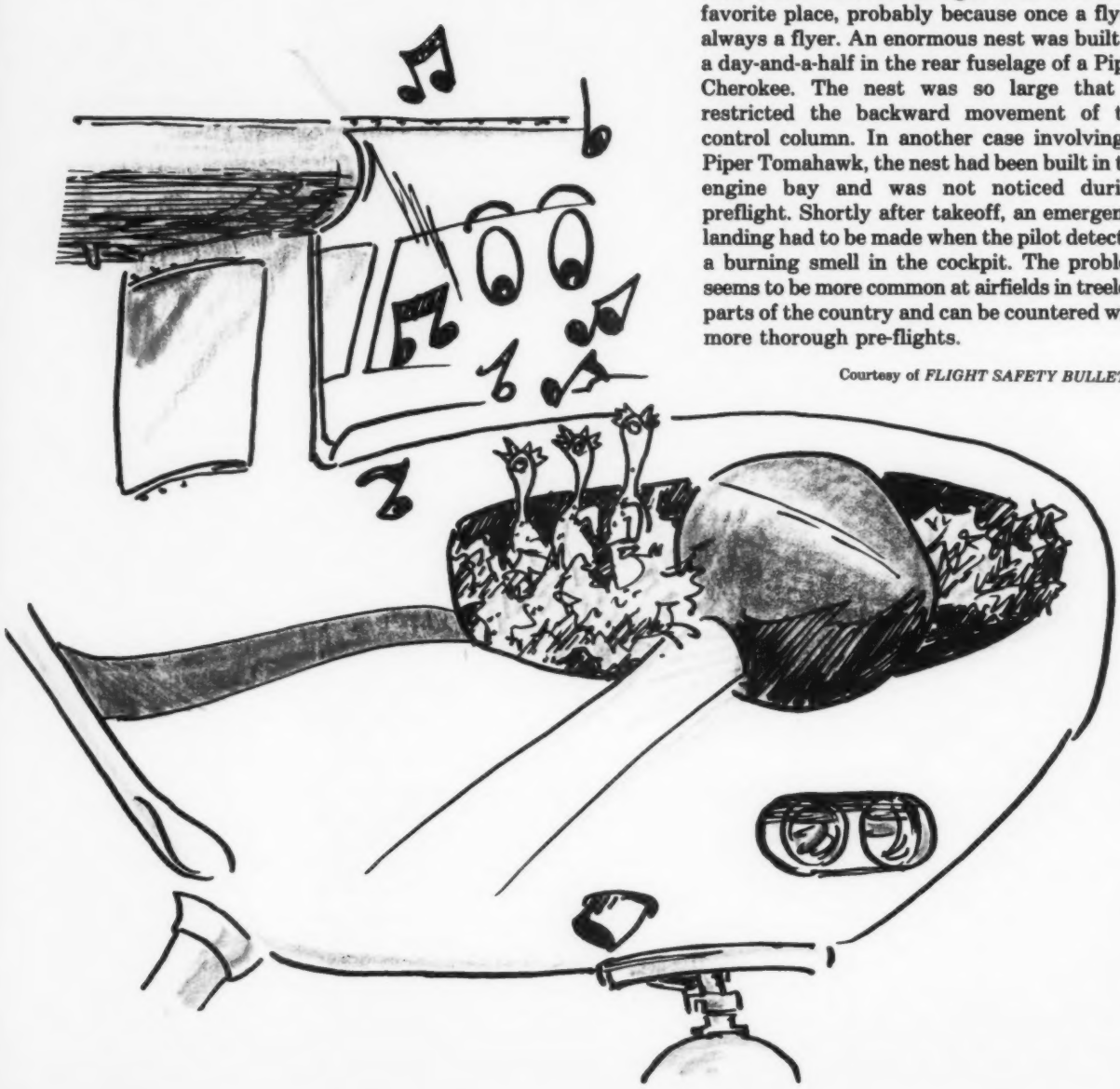
Recently, a MAC C-130 was the innocent victim of an unprovoked attack by a USAF F-16. The Herkey Bird was minding its own business, seemingly safely parked, when the incident took place. The F-16 was taxiing for takeoff when the pilot discovered he had lost his left brake. He pulled into the parking area, stopped the aircraft, and set the other brake. A few seconds later he lost his "B" system hydraulics and the aircraft, with engine still running, started to roll. Since both brakes were now inoperative, the pilot's options on how to stop the aircraft were rather limited. To his credit, he missed the C-130 on his first pass, but after subsequently losing his nose wheel steering, the F-16 went into a slow 180-degree turn and continued until stopped by the '130's right flap. Evidently, failure of the F-16 brake pressure plate will cause the brake pistons to slip out of their housing and result in a "B" hydraulic system failure, which causes a total loss of brakes and directional control. Sounds like somebody needs to go back to the drawing board.

QUICKSTOPPERS

IS A BIRD'S HOME ITS CASTLE?

One never ceases to be amazed at the apparent speed with which some birds build their nests. Aircraft fuselages seem to be their favorite place, probably because once a flyer, always a flyer. An enormous nest was built in a day-and-a-half in the rear fuselage of a Piper Cherokee. The nest was so large that it restricted the backward movement of the control column. In another case involving a Piper Tomahawk, the nest had been built in the engine bay and was not noticed during preflight. Shortly after takeoff, an emergency landing had to be made when the pilot detected a burning smell in the cockpit. The problem seems to be more common at airfields in treeless parts of the country and can be countered with more thorough pre-flights.

Courtesy of *FLIGHT SAFETY BULLETIN.*



Just Not Their Day

During takeoff roll, an ACM seated on the left side of the KC-10's passenger compartment felt fuel dripping on his head from an overhead panel. The crewmember proceeded to the cockpit to inform the aircraft commander who aborted the takeoff at 144 KIAS (22 knots above go speed). After clearing the runway and stopping, the AC directed an aircraft evacuation. During ground evacuation, the left door opened normally, but the slide fell backwards into the aircraft, blocking the exit. The right-hand door and slide worked.

Prior to this attempted flight, a crew chief had drained over one-half gallon of fuel from the forward leak sense drain. A fuels specialist also drained fuel from the line during his inspection. All together, 20 times more fuel was drained than allowed by T.O. When the aircrew arrived, a leak check was in progress—after an hour, only three drops of fuel were found and the AFTO 781 was signed off. So where did all that fuel come from? Two "O" ring seals on the air refueling manifold and a shroud coupler seal were found leaking. The leak check didn't detect them due to the method of conducting the leak check. As for the slide, a right-hand slide was installed incorrectly in the left side door. The slide was just moving in its designed direction.

WHERE THERE'S SMOKE . . .

As a retired passenger exited the C-9's lavatory, a crewmember noticed the smell of cigarette smoke emanating from the man's clothing. The crewmember checked the lavatory but could not smell smoke, and the smoke detector had not activated. After insuring the lavatory showed no sign of fire, the crewmember politely asked the passenger if he had smoked a cigarette. The passenger replied he had, and the crewmember asked for both cigarettes and lighter. The lighter was a butane disposable. The Aircraft Commander was notified of the incident and the passenger was ordered off the aircraft at the next stop. The smoke detector had checked out during preflight, but the "press to test" feature only verifies battery power. Upon arrival at home station, the Aircraft Commander asked a volunteer crewmember to spend several minutes smoking in the lavatory. Considerable smoke had to be generated before the alarm sounded. Just what are the operating limits on these things?

Helo Brush Hog

Another command's MH-53 on a night exercise infil/exfil mission discovered the hard way that rotor blades can indeed be used for clearing brush—although not a recommended procedure. The flight proceeded to a landing zone (LZ) on a small island. A mission planner had flown to the island just hours earlier to locate a suitable replacement LZ for one located in a wildlife preserve. He found a nice beach in the exercise area that led up to a short ridge—a challenging LZ, but the planner thought it was more than suitable. The hapless Helo was making an NVG overwater approach to the LZ when illumination flares began going off behind the ridge line. The flares degraded the NVGs and forced the crew to rely on terrain-following equipment to find the LZ. Without a large scale map or LZ photos, the crew was on its own to decide where to land. Sea spray, blowing sand, and debris limited visibility to 15 feet when the LZ was acquired.

Despite a careful landing, the right main gear sank five or six inches into soft dry sand. This, combined with a slight downhill slope of the LZ, put the main rotor blades down where they could whack away on a small scrub tree. The mission planner, riding as an observer, noted a change in rotor noise. After the troops disembarked, the helo departed for a holding point where the crew noted the change in rotor noise but no other indications of damage. When the mission was complete, post flight inspection revealed compression damage and delamination of all six main rotor blades. This may be one crew that will be more careful about landing sites in the future.

AFTER DEADLINES

PRIME KNIGHT ADOPTED BY AIR FORCE - Air Force-wide implementation of Project Prime Knight, an initiative intended to provide consistent, quality support to transient aircrews, is underway. Implementation will be completed by 1, Feb. with approximately 130 bases participating in the program. Each base will appoint a Prime Knight manager who will be responsible for ensuring aircrews receive express billeting check-in/check-out service, transportation support, and ready access to meals.

DOUGLAS AIRCRAFT COMPLETES ASSEMBLY OF FIRST C-17 - Wright-Patterson AFB, Ohio, 24, Dec 1990 - The first C-17A aircraft rolled off the assembly line on 21, Dec. marking the "assembly complete" milestone. Under the fixed-price contract "assembly complete" means that T-1 (training aircraft #1) is in a condition to leave the assembly building and begin planned, preflight qualification and ramp test without disruption from remaining manufacturing activities. This on-time achievement keeps the program on-track for a June 1991 first flight and delivery of the first aircraft in June 1992.

CRASH SURVIVOR RECEIVES AIRMAN'S MEDAL - The lone aircrew survivor of a MAC C-5 aircraft crash received the Airman's Medal for heroism. Despite suffering injuries, SSgt. Lorenzo Galvan Jr., risked his life by removing several passengers from the flaming wreckage near Ramstein AB, Germany. The loadmaster, from the Reserve's 433d Military Airlift Wing, Kelly AFB, Texas, is one of four survivors of the crash that killed 13 people.

★ U.S. GOVERNMENT PRINTING OFFICE: 1991-554-015/40003

TOUCH N GO

"Good job Sir," you're only a foot from where you landed yesterday.
U.S. AIR FORCE